CLAIMS

1. An underground distribution system (1) for the distribution of goods in an urban environment, comprising:
   - at least one micro-tunnel (2) forming at least one loop (7), extending under the foundations of preexisting surface buildings (B) and/or infrastructures (I) at a depth of at least 5 m, in which containers of goods, the transportation of which is automated, circulate unidirectionally,
   - a plurality of exchange stations (4 ; 6) exchanging with the surface, each comprising a shaft (10) allowing containers to be lowered down to the micro-tunnel (2) and raised back up after they have been transported within the micro-tunnel.
2. The system as claimed in claim 1, the exchange stations being configured to transport a plurality of containers (3) simultaneously to the surface or to the micro-tunnel.
3. The system as claimed in claim 1 or 2, the exchange stations comprising means (11) for transporting the containers (3) in a loop between the micro-tunnel and the surface.
4. The system as claimed in any one of claims 1 to 3, at least one exchange station (4; 6) being configured to store containers (3), notably while they are awaiting a surface pick-up of the goods they transport, the storage preferably being within the corresponding shaft (10).
5. The system as claimed in any one of claims 1 to 4, comprising shuttles (17) for transporting the containers (3), circulating in the micro-tunnel, preferably self-propelled shuttles.
6. The system as claimed in any one of claims 1 to 4, the containers (3) being self propelled so that they can move autonomously in the micro-tunnel.
7. The system as claimed in claim 5 or 6, the shuttles or containers being fitted with batteries so that they can be powered autonomously.

8. The system as claimed in claim 7, the shuttles or containers being recharged during their journey, notably in the micro-tunnel, by discrete or linear recharging terminals.
9. The system as claimed in one of claims 5 to 8, the shuttles or containers comprising wheels (18) rotating about axes of rotation that are not mutually parallel, preferably wheels resting directly on the wall of the micro-tunnel, the shuttles or containers preferably having an automatic system for centering the shuttle or the container in the lower part of the micro-tunnel.
10. The system as claimed in any one of claims 5 to 9, the shuttles (7) having, in cross section, an overall shape that at least partially mirrors that of the micro-tunnel, and notably comprising a cradle (19), to accept at least one container, preferably of arched shape, concentric with the wall of the micro-tunnel.
11. The system as claimed in any one of claims 1 to 10, the containers (3) having a cross section of circular overall shape.
12. The system as claimed in any one of the preceding claims, the micro-tunnel (2) having a cross section of circular overall shape.
13. The system as claimed in any one of the preceding claims, the micro-tunnel (2) comprising sections assembled one after the other, notably of a length of between 2.5 and 3.5 m, and with a wall thickness of between 150 and 500 mm, preferably configured to withstand a boring thrust of at least 500 metric tons.
14. The system as claimed in any one of claims 1 to 12, the micro-tunnel comprising assembled arch segments.
15. The system as claimed in claim 13 or 14, the sections or assembled arch segments being at least partially made of reinforced concrete, notably with a double layer of reinforcements.
16. The system as claimed in any one of the preceding claims, a largest interior dimension of the micro-tunnel, in cross section, notably the interior diameter thereof, being comprised between 1.5 m and 4 m, preferably between 2.5 and 4 m.
17. The system as claimed in any one of the preceding claims, the micro-tunnel being buried to a depth greater than or equal to 20 or 30 m.

18. The system as claimed in any one of the preceding claims, at least one of the containers (3) having independent compartments that can be opened and closed independently of one another.

19. The system as claimed in claim 5, comprising, at the exchange stations (4; 6) a system for unloading and/or loading the shuttles (17).

20. The system as claimed in any one of the preceding claims, the shaft of at least one of the exchange stations (4; 6) being sufficiently dimensioned to act as a working shaft when boring the micro-tunnel (2) using a micro-tunneling technique.

21. The system as claimed in any one of the preceding claims, comprising a system for regulating the transport of the containers, without overall flow management intelligence, each container and/or its transport shuttle being fitted with at least one sensor that allows a container and/or shuttle located in front thereof and the exchange stations to be located, the regulating system allowing the containers to regulate their speed according to the weight of traffic, to stop at the exchange stations, and potentially to push a broken-down vehicle in order to bring it out of the micro-tunnel loop.

22. The system as claimed in any one of the preceding claims, comprising exchange stations (6) away from the said urban environment, on the outskirts of the city, so as to make the goods easier to bring in and carry away by surface transport means (8).

23. The system as claimed in any one of the preceding claims, comprising surface transport vehicles for transporting the containers.

24. The system as claimed in claim 5, the shuttles (17) being hauled by at least one cable (42) within the micro-tunnel.

25. The system as claimed in claim 24, the cable running between two ends of a section of the loop formed by the micro-tunnel, these ends preferably being situated at exchange stations (4) exchanging with the surface.

26. The system as claimed in any one of the preceding claims, including claim 5, the shuttles (17) being configured to pass, during their journey within the loop formed by the micro-tunnel, from a first section (107a) of loop in which they are moved by a first cable to a second section (107b) of loop where they are moved by a second

cable different than the first, the transfer from the first section to the second taking place within an exchange station (6).

27. The system as claimed in any one of the preceding claims, including claim 5, each exchange station being configured to unload a shuttle arriving at the exchange station of at least some of its content which has reached its destination, and to raise this content back up to the surface.

28. The system as claimed in any one of the preceding claims, the goods to be transported being packaged on pallets.

29. The system as claimed in any one of the preceding claims, including claim 5, at least one exchange station comprising a mechanism for transporting a portion of track (90) bearing a shuttle (17) between a position for receiving a new shuttle coming from the transport loop, in which position the portion of track (90) runs in the continuation of the track extending in the micro-tunnel, and a position of switching to a loading/unloading track (91), which allows one or more containers (3) transported by the shuttle to be unloaded to a lift (60) or allows the shuttle (17) to receive one or more new containers (3) to transport.

30. The system as claimed in any one of the preceding claims, at least one exchange station connecting two sections (107a, 107b) of the micro-tunnel forming the loop which are oriented in different directions that make a non-zero angle between them.

31. The system as claimed in claim 30, said sections (107a, 107b) being straight.

32. The system as claimed in any one of the preceding claims, including claim 5, at least one exchange station comprising a turntable (96) bearing a mobile portion of track (95) on which at least one shuttle may position itself, the turntable being able to adopt a position in which the mobile track aligns with a track for bringing in shuttles, and a position in which said mobile track aligns with the track of the next section of micro-tunnel that is to be navigated.

33. The system as claimed in any one of the preceding claims, the exchange stations being situated on the loop and the system comprising at least one ordering station (6) for organizing the goods to be injected into the loop and to be distributed by means of the exchange stations (4) situated on the loop (7), the said at least one ordering station (6) being connected by at least one two directional transport line to the loop, notably to at least one exchange station of the loop.

34. The system as claimed in claim 33, the transport line comprising a tunnel in which containers or shuttles circulate two-directionally, or two micro-tunnels in which the containers or shuttles circulate in opposite directions.

35. The system as claimed in claim 17, the micro-tunnel being buried to a depth greater than or equal to 40 m.

36. A method for distributing goods in an urban environment using a system (1) as defined in any one of the preceding claims, comprising the steps consisting in:

a) bringing goods to an exchange station (6) by a surface means of transport (8), these goods being contained in at least one container,

b) lowering this container down to the micro tunnel (2),

c) circulating the container in the micro tunnel (2) as far as another exchange station (4) exchanging with the surface, the containers circulating unidirectionally in the micro-tunnel,

d) raising the container back up to the surface,

e) picking up the container or all or some of the goods contained therein,

f) delivering the container, either complete or in sub sets of elements preestablished at the time of packing of the container, to a consignee.

37. The method as claimed in claim 36, the container (3) remaining contained at the exchange station (4) without being raised back up to the surface, notably being stored in the shaft (10) of the exchange station, particularly while it awaits a request to pick up the container or goods contained therein.

38. The method as claimed in claim 36 or 37, the goods being injected into the transport loop predominantly via said transport line of claim 33 or 34.